

# COST-EFFECTIVE ARCHITECTURE FOR COMFORT AND ECONOMY

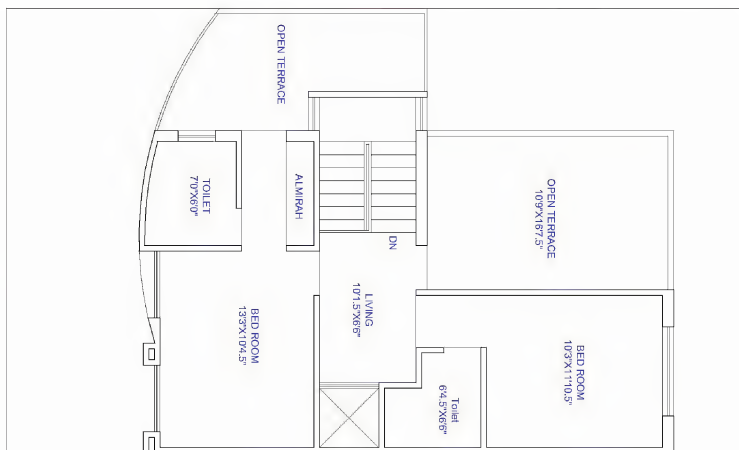
*Niharika Rana*

There are a number of ways to cut costs when constructing a building. Low-cost architecture is all about construction that optimises the various aspects of construction without changing the quality of the final product. Cost-effective does not mean substandard or poor quality structures. Quite the opposite, it involves strategies intended to optimise resources, technologies, material utilisation, and maximise efficiency of the structure.

"Cutting costs can be achieved in various ways without losing sight of utility or aesthetics", says BS Bhooshan, an architect and planner.

Design is one of the easiest way to cut down on costs. "First of all, you should know the limits of how you want to live. Look at the optimum size you can live comfortably in i.e. reduce consumption. Further, make the design effective and efficient - make sure every nook and corner has been utilised". A good design arranges the floor plan of a house in a way that maximum use comes from minimum area. Look for enduring concepts and aesthetics so that the ideas represented in your home are original for years to come. Also, using built-in furniture like stones for shelves or sofa can be unique and cuts costs.

FIRST FLOOR PLAN





***A design for low-cost buildings does not have to be strictly functional. The ultimate objective of architectural design is to create enjoyable living spaces. It takes dedication, vision, and passion to establish cost-effective and environment-friendly architecture.***

The issue of cost-effective material and technology has been a topic of debate in the construction industry. There is a perception that these technologies make great theory but is not always realistic. A lot of these technologies have failed during delivery. "The main reason for its failure is the lack of good skilled laborers, indifference, and poor supervision". Nevertheless, these techniques have been put to practice in the past. An outstanding example of cost-effective architecture is the works of the well-known architect Laurie Baker. Baker is known to have initiated a whole tradition of green architecture in India.

Green architecture apparently cuts overall construction costs by about 25 percent, while ensuring substantial savings on maintenance expenses. Baker has been experimenting and employing these technologies effectively since the sixties. So it's quite hard to imagine why with all our technological advancements we aren't implementing them today.

Baker propagated the use of locally available materials and cost-effective architecture. He essentially believed that materials like brick, tile, lime, palm thatch, stone, granite and laterite could create low-cost buildings. Besides, the use of mud blocks like adobe or stabilised compressed earth blocks can also cut costs to a large extent. Adobe bricks are soil and water carefully mixed together and shaped in a mould. This is later dried by the sun. Stabilised compressed earth blocks are made by pressing earth into a block using

limestone as a stabiliser. The fascinating feature about mud blocks is the fact that it can be made on site and the mud excavated in the site can be partly used to make these blocks.

In terms of technologies there are various cost-effective solutions like use of filler slabs, Ferro cement, rat-trap walling system, arch opening or stone lintels and also use of vaults or domes. Filler slab is a construction of roof slab using cement and filler-like clay tiles or coconut shells with steel rods used as a skeleton. The idea is to substitute the conventional concrete roof slab, which usually consumes more steel and cement. Filler slab reduces the use of concrete by 20 percent and steel by 50 percent, which will ultimately reduce costs. Ferro cement is a sheet made of chicken mesh covered by a thin layer of concrete. It is commonly used for doors, windows, roof covers, shelves, and even water tanks. Ferro cement roof can save a considerable quantity of cement, sand, and steel skeleton, compared to a conventional concrete slab. Rat-trap walling system was first introduced by Laurie Baker. This type of bonding of walls leads to a lesser number of bricks and joints needed in the construction, and hence saves on cement mortar. This technique reduces the use of bricks by 17 percent and cement mortar by 54 percent. Reinforced concrete lintel can be replaced with stone lintels or arches. Arches or stone lintels can be effectively used in openings. They eliminate the use of costly steel and concrete in RCC lintels. "Brick vaults and domes are other low-cost alternatives as they don't require steel reinforcement". They are structurally stable due to their

shape and form, and will require little or no reinforcement.

**Precast concrete is an architectural material with a unique combination of strength and versatility. In the hands of an imaginative designer and an expert fabricator, it can assume a rich variety of forms, textures, and colors, while performing an array of structural and decorative roles.**

Typically produced in a plant away from the construction site, precast concrete can be formed into virtually any shape to create structural elements or flat panels articulated with copings, returns, soffits, jambs, or sills. Cast-in hardware can be positioned for structural reinforcement or to facilitate

installation. Geometric designs and lettering can be "molded" by the forms. Materials such as natural stone can be placed in the form before the pour to become the resulting surface finish, or panels can be cast with cavities for later installation of tile or brick.

The appearance of precast concrete can be further modified through selection of its components: cement, pigments (usually iron oxides), sand, and coarse aggregate (crushed rock, pebbles). Surface textures can also be modified by the material of the forms and the treatment of the unit after curing. The coarse aggregate can be exposed by sandblasting, while light sandblasting produces a sand texture, and acid etching makes a surface resembling natural stone.

## REINFORCED CONCRETE BOX

A reinforced concrete box, referred to as a box culvert in the UK, is a square or rectangular "pipe" made of concrete with rebar or wire mesh fabric strewn throughout for the addition of extra strength. Multiple such boxes are arranged sideways to make a pipe or tunnel like structure.

It is often used for sanitary sewer trunks, storm drain spillways, pedestrian subways, utility tunnels, catch basins, and other similar underground passage ways. Due to the enormous strength of reinforced concrete, it is often used in sewers or tunnels that have little cover above them which means they will be subjected to the stress of the road atop them. In India, pre-cast concrete boxes known as "Magic Boxes" are used for the construction of flyovers and underpasses.

